



**Excelsior**  
MINING CORP

TSX.V: **MIN**  
Frankfurt: **3XS**  
OTCQX: **EXMGF**

**Permitting Meeting  
Gunnison Copper Project**

March 9, 2017

ED\_001697\_00006947-00001

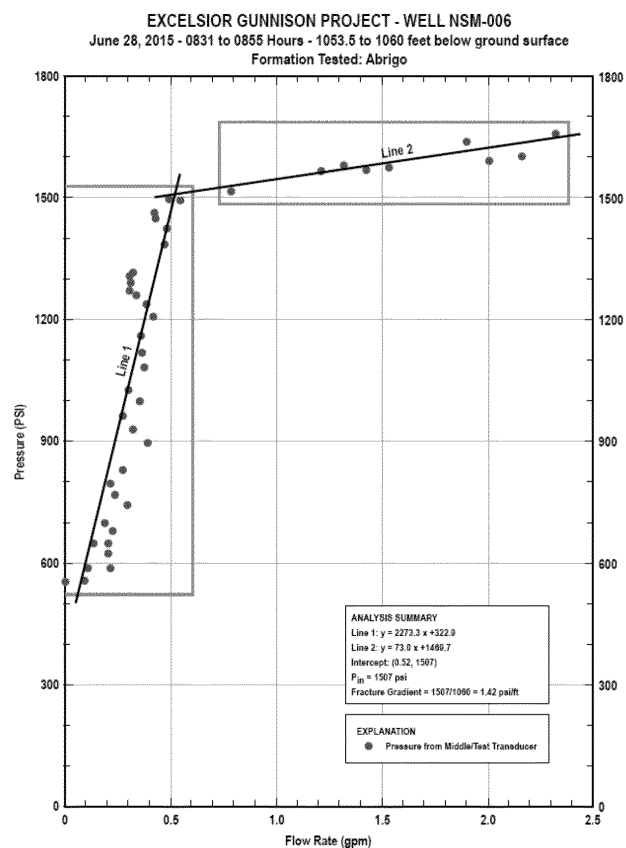
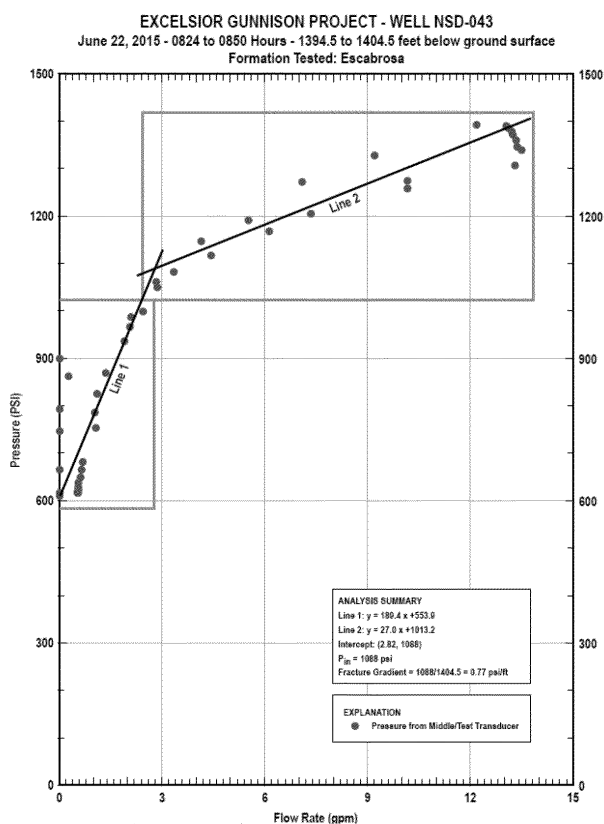
## Comparison of Step Rate Test vs Intercept Method

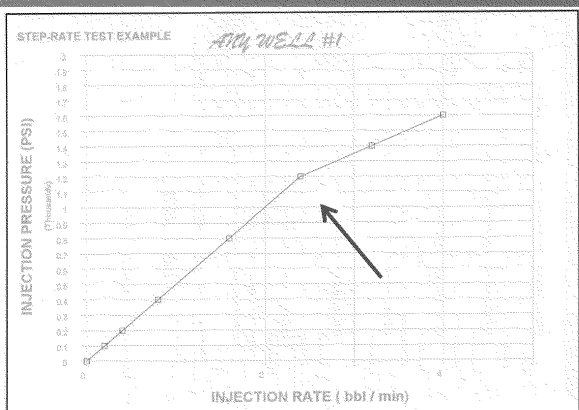
- The Step Rate Test Procedure
  - Designed for completed wells, with casing grouted in and perforated
  - Tests the entire well and all the perforations.
  - Not applied in open holes
  - Best results are obtained in hydraulically conductive intervals, not tight non-productive intervals

- The Intercept Method
  - Applied in open holes and at selected intervals
  - Applied in conjunction with straddle packers to isolate specific intervals.
    - Specific intervals required due to borehole conditions (minimum borehole diameter requirements).
    - And hydrogeologic limitations

- In both cases, Pressure, Flow (volume and flow rate) and time are recorded.
- Flow and pressure are increased until the rock yields to the stress and “fractures”.
- The pressure at which the fracture occurs is used to estimate the fracture gradient.
- However, for the fractured, hydrogeologically heterogeneous environment at Gunnison, the Intercept Method is more appropriate.

# Intercept Method Data Sets



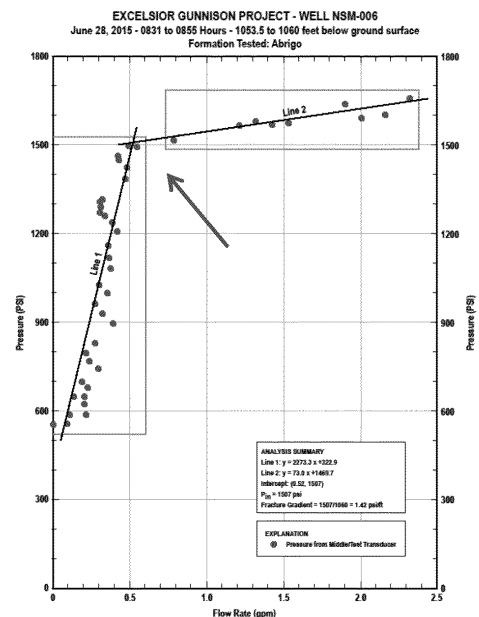


The Step Test uses the point of inflection or the intercept of the two lines to estimate fracture break pressure.

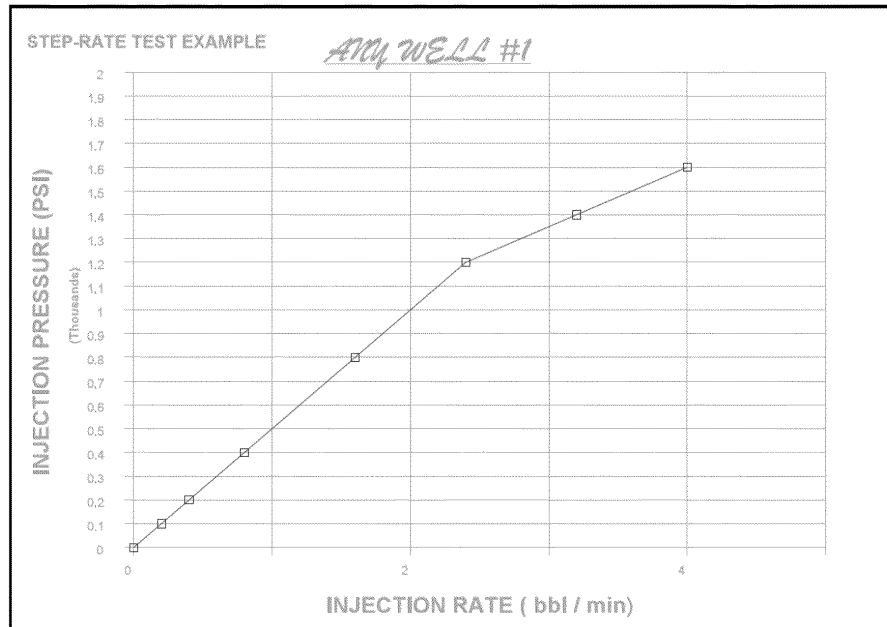
The intercept method does the same thing.

The difference is the amount of time spent to gather each data point.

However, the result is the same.



# Step Rate Test



From EPA Guidance

**Table A - Formation Fracture Pressure Gradient, Excelsior Gunnison Copper Project (Peak Pressure Method)**

Borehole Information							Formation (psi/foot)						
Borehole	Borehole Diameter (inches)	Test Date	Test Number	Test Interval Depth (ft bls)	Bit Depth (ft bls)	Estimated Fracture Pressure (psi)	Horquilla	Escabrosa	Martin	Upper Abrigo	Middle Abrigo	Lower Abrigo	Overall Well Average
NSD-043	4	21-Jun-15	1b	1,504.5	1,485.5	1,925			1.28				1.38
		22-Jun-15	2	1,445.0	1,426.0	2,000			1.38				
		22-Jun-15	3a	1,404.5	1,385.6	1,380		0.98					
		22-Jun-15	3b	1,405.5	1,386.6	1,305		0.93					
		22-Jun-15	4	1,170.0	1,154.5	2,325		1.99					
		23-Jun-15	5	996.5	981.0	1,695	1.70						
NSM-008	4.75	24-Jun-15	1	1,239.5	1,224.0	2,485						2.00	1.79
		24-Jun-15	2	1,054.6	1,039.0	1,585					1.50		
		24-Jun-15	3	1,010.0	994.5	1,800					1.78		
		24-Jun-15	4	986.5	971.0	1,865				1.89			
		25-Jun-15	5	901.7	886.0	1,580				1.75			
NSM-009	5.15	26-Jun-15	2	1,276.7	1,261.0	2,010					1.57		1.62
		27-Jun-15	3	1,102.0	1,086.5	1,585				No Test			
		27-Jun-15	4	942.0	926.5	1,560				1.66			
NSM-006	3.75	28-Jun-15	1	1,060.0	1,044.6	1,580					1.49		1.75
		28-Jun-15	2	937.0	921.5	1,460					1.56		
		28-Jun-15	3	921.0	905.5	1,620					1.76		
		29-Jun-15	4	798.0	782.5	1,580				1.98			
		29-Jun-15	5	782.6	767.0	1,485				1.90			
		29-Jun-15	6	766.0	750.5	1,380				1.80			
NSM-007	3.75	30-Jun-15	1	1,070.0	1,054.5	1,790			1.67				1.53
		30-Jun-15	2	1,039.7	1,024.0	1,560			1.50				
		30-Jun-15	3	823.7	808.0	1,355			1.65				
		30-Jun-15	4	781.5	766.0	1,180			1.51				
		30-Jun-15	5	734.0	718.5	1,110			1.51				
		30-Jun-15	6	660.7	645.0	885			1.34				
NSD-037	3.75	2-Jul-15	1	747.0	-	1,660					2.22		1.95
		2-Jul-15	2	726.7	-	1,370			1.89				
		2-Jul-15	3	705.0	-	1,225			1.74				

Formation Average Fracture Gradient  
Number of Tests per Formation

1.70 1.30 1.55 1.78 1.69 1.75 1.67  
1 3 10 9 8 1

Notes:  
ft - feet  
bls = below land surface  
psi = pounds per square inch  
formation fracture pressure gradient - estimated breakthrough pressure / depth of bottom of packed interval in ft bls

**Table B - Formation Fracture Pressure Gradient, Excelsior Gunnison Copper Project (Q vs P Intercept Method)**

Borehole Information							Formation (psi/foot)						
Borehole	Borehole Diameter (inches)	Test Date	Test Number	Test Interval Depth (ft bls)	Bit Depth (ft bls)	Estimated Fracture Pressure (psi)	Horquilla	Escabrosa	Martin	Upper Abrigo	Middle Abrigo	Lower Abrigo	Overall Well Average
NSD-043	4	21-Jun-15	1b	1,504.5	1,485.5	1,563			1.04				1.21
		22-Jun-15	2	1,445.0	1,426.0	1,712			1.18				
		22-Jun-15	3a	1,404.5	1,385.6	1,090		0.78					
		22-Jun-15	3b	1,405.5	1,386.6	1,310		0.93					
		22-Jun-15	4	1,170.0	1,154.5	2,199		1.88					
		23-Jun-15	5	996.5	981.0	1,454	1.46						
NSM-008	4.75	24-Jun-15	1	1,239.5	1,224.0	1,197						0.97	1.52
		24-Jun-15	2	1,054.6	1,039.0	1,563					1.48		
		24-Jun-15	3	1,010.0	994.5	1,705				1.69			
		24-Jun-15	4	986.5	971.0	1,791				1.82			
		25-Jun-15	5	901.7	886.0	1,488				1.65			
NSM-009	5.15	26-Jun-15	2	1,276.7	1,261.0	1,963					1.54		1.60
		27-Jun-15	3	1,102.0	1,086.5	1,585				No Test			
		27-Jun-15	4	942.0	926.5	1,565				1.66			
NSM-006	3.75	28-Jun-15	1	1,060.0	1,044.6	1,507					1.42		1.71
		28-Jun-15	2	937.0	921.5	1,546					1.65		
		28-Jun-15	3	921.0	905.5	1,558				1.69			
		29-Jun-15	4	798.0	782.5	1,516				1.90			
		29-Jun-15	5	782.6	767.0	1,425				1.82			
		29-Jun-15	6	766.0	750.5	1,360				1.78			
NSM-007	3.75	30-Jun-15	1	1,070.0	1,054.5	1,752			1.64				1.46
		30-Jun-15	2	1,039.7	1,024.0	1,492			1.43				
		30-Jun-15	3	823.7	808.0	1,337			1.62				
		30-Jun-15	4	781.5	766.0	1,134			1.45				
		30-Jun-15	5	734.0	718.5	1,093			1.49				
		30-Jun-15	6	660.7	645.0	757			1.15				
NSD-037	3.75	2-Jul-15	1	747.0	-	1,590					2.13		1.78
		2-Jul-15	2	726.7	-	1,353			1.86				
		2-Jul-15	3	705.0	-	944			1.34				

Formation Average Fracture Gradient

Number of Tests per Formation

1.46      1.20      1.42      1.71      1.66      1.20      1.55  
1      3      10      9      8      2

Notes:

ft - feet

bls = below land surface

psi = pounds per square inch

formation fracture pressure gradient - estimated breakthrough pressure / depth of bottom of packed interval in ft bls

### Relevant to

- Comment 12b
- Comment 15
- Comment 20
- Comment 63—post closure monitoring

# Revised Closure Strategy (applicable to EPA comments 20, 12b, 6)

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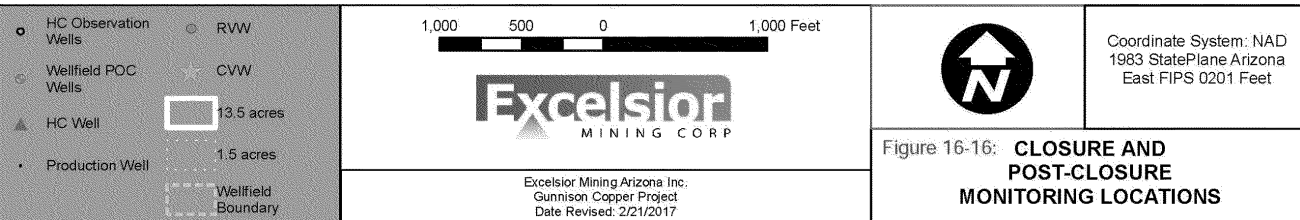
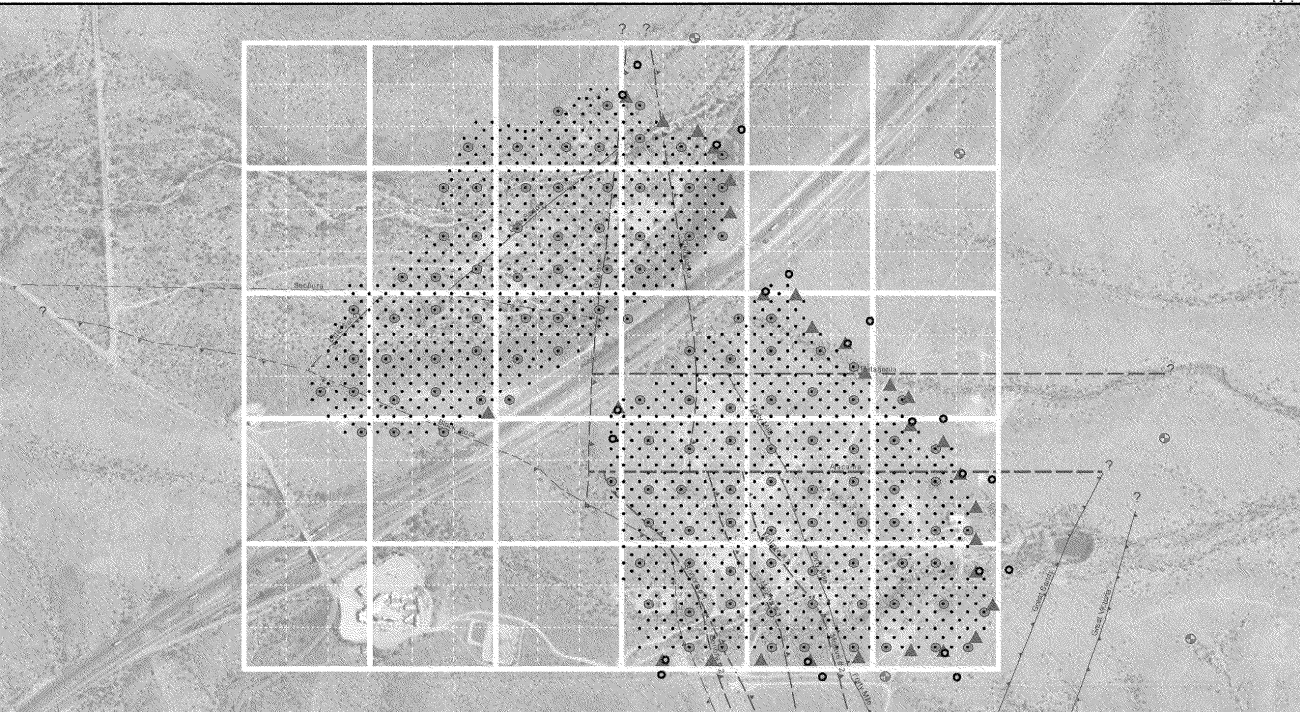
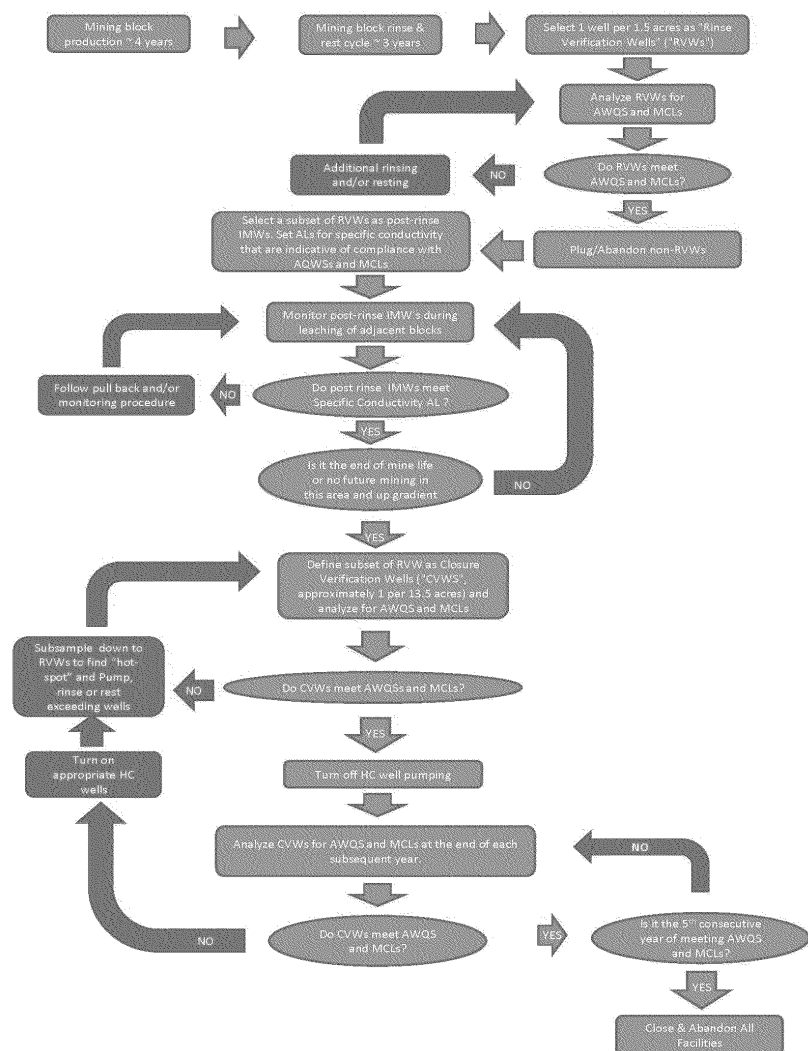


FIGURE 16-15: Closure Strategy Decision Tree



Decision tree—closure strategy

# Comment 58—7520-14 forms

**Excelsior**  
MINING CORP

OMB No. 2040-0042 Approval Expires 11/30/2014

**EPA** United States Environmental Protection Agency  
Washington, DC 20460

## PLUGGING AND ABANDONMENT PLAN

Name and Address of Facility:  
EXCELSIOR MINING CORP  
GUNNISON PROJECT

Name and Address of Owner/Operator:  
EXCELSIOR MINING CORP  
CONCORD PL., 2999 N 44TH ST, STE 300, PHOENIX, AZ 85018

State: AZ County: Cochise Permit Number: TBD

Surface Location Description: Section 36 Township 15S Range 22E OR  
1/4 of 1/4 of 1/4 of 1/4 of Section 31 Township 15S Range 23E

Locate well in two directions from nearest lines of quarter section and drilling unit

Surface Location: ft. from (N/S) Line of quarter section  
and ft. from (E/W) Line of quarter section.

TYPE OF AUTHORIZATION:  
☐ Individual Permit  
☒ Area Permit  
☐ Rule  
Number of Wells: TBD

WELL ACTIVITY:  
☐ CLASS I  
☐ CLASS II  
☐ Brine Disposal  
☐ Enhanced Recovery  
☐ Hydrocarbon Storage  
☒ CLASS III  
Well Number: Hydraulic Control Wells

Lease Name: \_\_\_\_\_

### CASING AND TUBING RECORD AFTER PLUGGING

SIZE	WT (LB/FT)	TO BE PUT IN WELL (FT)	TO BE LEFT IN WELL (FT)	NOLE SIZE
6.1	Unknown	0	Unknown: ~300-700	6.1

### METHOD OF EMPLACEMENT OF CEMENT PLUGS

☒ The Balance Method  
☐ The Dump Bailer Method  
☐ The Two-Plug Method  
☐ Other

### CEMENTING TO PLUG AND ABANDON DATA:

	PLUG #1	PLUG #2	PLUG #3	PLUG #4	PLUG #5	PLUG #6	PLUG #7
Size of Hole or Pipe in which Plug Will Be Placed (Inches)	6.1	5.0					
Depth to Bottom of Tubing or Drill Pipe (ft)	TBD	TBD					
Sacks of Cement To Be Used (each plug)	TBD	TBD					
Slurry Volume To Be Pumped (cu. ft.)	TBD	TBD					
Calculated Top of Plug (ft.)	2	TBD					
Measured Top of Plug (if tagged ft.)							
Slurry WT (Lb./Gal.)	15.6	15.6					
Type Cement or Other Material (Class III)	V	V					

### LIST ALL OPEN HOLE AND/OR PERFORATED INTERVALS AND INTERVALS WHERE CASING WILL BE VARIED (if any)

From	To	From	To
TBD	TBD		

Estimated Cost to Plug Wells:  
\$10,300

### Certification

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref. 40 CFR 144.32)

Name and Official Title (Please type or print):  
Roland Goodgame, Executive Vice President

Signature: \_\_\_\_\_ Date Signed: \_\_\_\_\_

EPA Form 7520-14 (Rev. 12-11)

These are generic forms. Do we really need to sign them?

We will be submitting completed forms prior to P&A

### Comment 3: Exempt top 200' sulfide zone



- Excelsior will add proposal to include upper 200 feet of sulfide zone.
- Basis for exemption? Possible fault connections with oxide zone.
- While the hydraulic conductivity in the sulfide zone is low, as demonstrated by two aquifer tests, EPA's concern is that the absence of a confining layer between the oxide and sulfide zones will result in an exchange or mixing of aquifer fluids between the oxide and sulfide zones during ISR operations. EPA says this is most likely to occur where injection and recovery wells are situated near a fault zone and the oxide-sulfide interface.

## **CRAI 2**

### **Methdology for ALs for Specific conductance**



- ALs for outer ring of IMWs will indicate when to turn on HC wells or initiate pumpback.

Per ADEQ request, Excelsior will:

- propose ambient monitoring of specific conductance
- Contingency language for adjusting operations, installing HC wells (if not already installed) and adjusting of HC pumping.

END